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CIA No. 3416
29 June 1965

MEMORANDUM FOR: Mr. Thomas J. Corcoran
 Director, Viet-Nam Working Group
 Department of State
 Room 5207

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Committee

SUBJECT: Transmittal of Memorandum on The Economic Impact of Possible Interdiction Measures Against North Vietnam

1. The attached memorandum on The Economic Impact of Possible Interdiction Measures Against North Vietnam is submitted in accordance with your memorandum of 21 June 1965 to the members of the Subcommittee on Trade and Shipping with North Viet-Nam.

2. The analysis in this memorandum considers the economic impact of a US Naval quarantine, a blockade of North Vietnam ports, a denial of rail access to North Vietnam, or a combination of these measures. A combined blockade and denial of rail access would inflict the greatest economic damage on North Vietnam. It is pertinent to note, however, that a simultaneous denial of the use of the three major rail lines in the country would yield results of almost the same magnitude and at the same time avoid the many political and diplomatic problems associated with a blockade.

3. In spite of the varying levels of economic damage associated with those measures, no single measure or combination of measures can be expected to be the palliative for the Viet Cong problem. These measures substantially curtail the output of the small modern industry sector of the Vietnamese economy. The economy is, however, still an essentially agrarian one which will be able to continue functioning

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at a subsistence level without foreclosing the ability of the North Vietnamese to continue waging the war in South Vietnam. Minimum military supplies most probably could continue to flow into North Vietnam from Communist China by primitive transport means even in the face of a successful combined program of interdicting transportation links.

FOR THE ASSISTANT DIRECTOR, RESEARCH AND REPORTS:

[REDACTED]

Chief, Economic Research Area

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The Economic Impact of Possible Interdiction Measures
Against North Vietnam

S - 1555

29 June 1965

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Summary and Conclusions

This paper considers a range of economic interdiction measures which might be undertaken by the US against North Vietnam. The alternatives are (1) a quarantine; (2) a blockade; (3) a denial of rail transportation; and (4) a complete denial of rail and sea access to North Vietnam.

(1) Quarantine.

A quarantine directed strictly against the supply of arms and military equipment would have no direct economic impact upon North Vietnam. Even if the quarantine should induce Free World shipowners to withdraw from the trade there would be little difficulty in obtaining alternative shipping from Communist sources. Import cargoes and general cargo moving in North Vietnam's export trade could be handled by Communist ships already assigned to trading with North Vietnam. The transport of North Vietnam's export trade in bulk commodities--principally coal and apatite--would require the full time assignment of 21 ships from the fleets of other Communist countries; the USSR and Poland are the principal Communist maritime nations.

(2) Blockade.

An offshore blockade of the seaports of North Vietnam would cut off imports that normally arrive in foreign ships. However, most of this tonnage could be moved through the ports of Communist China and then carried by railroad and road into North Vietnam without disrupting the traffic presently being moved by these modes of transport. Neither

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the transloading facilities at P'ing-hsiang nor the narrow-gauge rolling stock inventory (with the possible exception of tank cars) would be a limiting factor in attaining the estimated capacity of the P'ing-hsiang-Hanoi rail line. The increased costs and other essential uses for truck transport would probably limit the extent to which motor transport would be used to supplement shipment by rail. The use of motor transport would depend on the priority that North Vietnam and China attach to the maintenance of imports that currently arrive by sea.

(3) Denial of Rail Transportation.

If the North Vietnamese were denied the use of rail service, then highway transport, ocean shipping, and inland water transport would be available as alternatives. If the Hanoi-Dong Dang line were interdicted there would theoretically be sufficient highway capacity, at least during the dry season, to move the estimated traffic normally carried on this line. Limitations such as the truck inventory, and fuel and service facilities make it unlikely, however, that this traffic could be absorbed by the highway system. If use of the Hanoi-Lao Cai line were denied to the North Vietnamese some freight could be shifted to road and inland water transportation, although it would be almost impossible for bulk shipments of apatite to be made. Most of the Chinese transit traffic through North Vietnam would also be halted. If the Hanoi-Kaiphong line were interdicted alternative means of transportation could carry almost all of the additional traffic necessitated by the loss of the line.

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If the three major rail lines were interdicted simultaneously the impact on the modern industrial economy of North Vietnam would be severe. The disruption created in the internal transport system by the loss of the lines moving about 90 percent of all railroad traffic would necessitate strict rationing of transport resources and a rigid system of priorities for the movement of goods. It would be quite impossible for the remaining transport systems to satisfy the requirements of both domestic and foreign trade.

(B) Combined Measures.

Since North Vietnam is dependent on foreign trade for its industrial development, a complete denial of most imports for 2 months or longer by a combination of sea blockade and interdiction of rail lines would cause industrial output to fall drastically and bring to a halt the construction of industrial projects. The most serious effect on industry and transportation would result from the denial of import of petroleum products. The denial of food imports would have little effect on the food supply of the population since the economy is basically self-sufficient in food. Interdiction of ports and rail lines would also increase the time required to import military supplies but it would not immediately hamper the war effort against South Vietnam and could not halt completely the flow of military goods from Communist China and the USSR. The greatest impact on military operations in Laos and South Vietnam would result from the denial of petroleum products which would

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reduce the mobility of some of the military forces. Complete denial, however, is virtually impossible to impose on a country other than by occupation. Primitive transport can move the highest priority traffic in some volume, as the Korean war experience showed.

The economic disruption inflicted by these measures either singly or in concert would be felt particularly in the small modern industry sector of the economy of North Vietnam. Since the country is basically an agrarian one, it could continue to function at a subsistence level, which would not destroy the ability of North Vietnam to continue its military activities in South Vietnam.

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I. The Economic Environment.

A. Nature of the Economy.

The North Vietnamese economy, which is basically one of subsistence agriculture, has only a small modern industrial sector concentrated in a few urban centers. This small industrial sector is heavily dependent on imports of machinery and raw materials, principally from Communist China and the USSR. The country imports little food even in poor agricultural years and depends largely on domestic production to feed its population of about 18 million persons.* North Vietnam produces only minor items of military equipment -- grenades, mines, mortars, and ammunition for small arms -- and must import all of its heavy military equipment and most of its small arms, ammunition, and medical supplies from Communist countries.

The industrialization program of North Vietnam is relatively ambitious in comparison to pre-Communist efforts and in comparison to the industrial programs of most other underdeveloped countries of Asia. The machine-building industry, the chemical industry, the food processing industry, and several other light industries constitute the core of the new modern industrial structure of the country. Industries in existence before the Communist takeover, such as cement and textiles, have been

* About 80 percent of the labor force is engaged in agriculture and in 1964 the value of agricultural production probably accounted for almost half of the gross national product (GNP).

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expanded. The country also is building with Chinese aid a 100,000-ton steel mill at Thai Nguyen which is already producing pig iron and is expected to be producing crude steel and some rolled products by the end of 1965. This plant is the most expensive foreign aid project to be built in North Vietnam and represents the basic element in the regime's plans for an iron and steel industry.

B. Economic Significance of Foreign Trade.

The foreign trade of North Vietnam, which has been such an important factor in the economic development of the country, was equal to about 15 percent of GNP in 1964. The value of foreign trade has more than tripled since 1955, increasing from US \$80 million in 1955 to an estimated US \$267 million in 1964.* Over 80 percent of North Vietnam's foreign trade in 1963 was with Communist countries. The USSR and Communist China have been its principal trading partners, accounting together for about two-thirds of its total trade in 1963. Soviet-North Vietnamese trade in 1963 was valued at US \$92 million, an 8 percent increase above the level of 1962. North Vietnam's trade with Communist China in 1963 is estimated to have been between US \$70 million and US \$75 million. Trade with these two countries increased somewhat in 1964 and is scheduled to increase even further in 1965 according to

* Imports of US \$158 million and exports of US \$109 million. Cumulatively, from 1955 through 1964 the import surplus amounted to over US \$500 million, or nearly half of all imports.

recently announced trade agreements. The expansion in trade which was planned for the past several years has not taken place as rapidly as expected, however, because of a lack of products for export.

About half of the value of total imports of North Vietnam consisted of machinery and equipment during 1961-63. Soviet deliveries of equipment for complete plants grew particularly rapidly during this period. Imports from Communist China consist largely of industrial raw materials and semimanufactured products with machinery being less important than it is in imports from the USSR. Imports from countries of the Free World, which made up 14 percent by value of total imports in 1963, consist primarily of manufactured goods and chemicals.

The most critical industrial supply item imported by North Vietnam is petroleum. Until 1963 the USSR supplied almost all the petroleum imported but in that year Rumania became an important supplier, providing about 20 percent of the total. Most industrial chemicals are also imported, although the small indigenous chemical industry has recently been expanded particularly to produce chemical fertilizer. The country also imports all of its steel products, practically all of its railroad rolling stock and vehicles, and most of its complex machinery and metal manufactures, spare parts, chemical fertilizers, and raw cotton. North Vietnam has little in the way of a domestic armaments industry, relying almost completely on the USSR and Communist China for military equipment. Unfortunately the volume of military imports, which probably have a

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rather considerable value, cannot be estimated with any degree of precision; it is believed, however, that the North Vietnamese data on total imports exclude all such items.

North Vietnam exports handicraft products made from agricultural raw materials, light industrial products, and some unprocessed agricultural products, although exports of the latter have declined since 1959. Products of the extractive industries, particularly anthracite coal and apatite, make up about one-third of the value of total exports.

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II. Impact of a Naval Quarantine

A quarantine on seaborne trade is a selective restriction that can be applied to specific cargoes or to trade between specific areas. For the purposes of this paper, the quarantine is assumed to mean a prohibition of the transport by sea of any arms or military equipment to North Vietnam.

The institution of a quarantine applied strictly to the shipment of military supplies to North Vietnam would not restrict the flow of goods for purely economic use and, therefore, would have no direct effect upon the economy of North Vietnam. Before a quarantine could have any economic impact the list of proscribed goods would have to include a broad range of strategic items that may have a joint military-economic use.

The imposition by the US of a naval quarantine, however, could cause Free World ships to withdraw from the trade. Their withdrawal would probably be accelerated if the US were to warn of its inability to guarantee the safety of ships calling at North Vietnamese ports, and particularly if port facilities were to be subjected to occasional air attack. Although it is impossible to predict the numbers of Free World ships that would withdraw from the trade, the maximum impact can be gauged by assuming that all Free World shipping would leave the trade and that Communist Bloc shipping would remain.

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Free World shipping in 1964 carried about 45 percent of identified North Vietnamese seaborne imports and 85 percent of identified exports.* It is estimated that Free World shipping to North Vietnam in the first quarter of 1965 carried identified import cargoes amounting to only 11 percent of the cargo carrying capacity of Free World ships calling at North Vietnam in the period. This low level of utilization of cargo carrying capacity reflects the large number of ships known to have arrived in ballast. The Free World ships departing North Vietnam during the period were utilized to 90 percent or more of their cargo carrying capacity.

Inbound cargoes in Free World ships consist mainly of foodstuffs, fertilizers and general cargo. Communist shipping currently employed in the North Vietnamese trade, especially the Polish ships in liner service, could take over the volume carried in Free World ships by adjusting schedules and probably with little or no increase in the numbers of ships employed.

Assuming that the pattern and volume of North Vietnam's seaborne export trade in 1965 will be substantially the same as in 1964, the Free World ships in the trade could easily be replaced by Communist ships employed full time in the service of North Vietnam. The

* Complete data on the 1964 seaborne foreign trade of North Vietnam, if available, would show Free World ships carrying somewhat smaller shares because observed cargoes carried in Communist Chinese ships are known to constitute only a small portion of the total.

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anticipated volume of outbound general cargoes could be handled by the Communist shipping currently involved in trading with North Vietnam. The major problem would be to substitute Communist-flag ships for the Free World ships currently employed in the export of bulk commodities. An estimated thirteen 9,700 ton and eight 5,100 ton bulk carriers utilized full time could carry North Vietnam's exports of apatite and coal.* Ships of this type and number could easily be provided from Communist maritime fleets, particularly from the Soviet and Polish fleets. The Communist countries could then substitute other chartered Free World ships to operate in areas other than North Vietnam. An adjustment of this nature could probably be made effective within 2-3 months of the time of imposition of the quarantine. To a limited extent Communist shipping is already replacing the Japanese ships that stopped calling at North Vietnam in late March. Four Soviet ships were engaged in carrying North Vietnamese coal to Japan during May.

It is possible that the Communist countries assisting North Vietnam would absorb at least part of any increased costs resulting from the substitution of ships necessary to counter the effects of a US naval quarantine. It is also possible that as an expression of solidarity Communist maritime countries would form a new and highly publicized shipping line to sustain North Vietnam's seaborne trade. Precisely such a step was taken at the time of the US quarantine of Cuba.

* The 9,700 ton carriers would be used in the long haul coal trades to Cuba, Western Europe and North China ports. The smaller carriers would be used in the coal trade with Japan.

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III. Impact of a Blockade of Sea Ports

The assumption of blockade is interpreted to mean the interdiction of sea ports to ocean-going ships engaged in international trade. As an off-shore blockade it would, therefore, not deny to North Vietnam and/or Communist China the use of small ships engaged in coastal trade. These coastal ships would probably be able to ply freely between ports in North Vietnam and Communist China and represent a possible means of circumventing some of the impact of a blockade. Although this paper does not attempt to quantify the volume of trade which might be carried in coastal operations, it is certainly adequate to permit the movement of high priority cargoes between Communist China and North Vietnam.

In the event of a total blockade of the sea ports of North Vietnam, the tonnage of imports that normally arrive in North Vietnam by sea probably could be moved through the ports of Communist China and thence carried on the railroad and roads from Kwangsi Province, China, to Hanoi.* In addition the railroad could continue to move the volume of freight traffic currently moving on the line. A conservative estimate of the capacity of the meter-gauge rail line between P'ing-hsiang, the transloading station in China, and Hanoi is about 3,000 metric tons (mt) each way per day** or about 1.1 million mt per year. The connecting railroad in China has a higher capacity. It is

* The economic importance of the railroad lines in North Vietnam is discussed in section IV, below, p. 17.

** The capacity of this line is estimated to be 9 trains each way per day, carrying an average of 20 to 25 freight cars per train. It is estimated that the average net load per freight car is about 15 tons.

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estimated that toward the end of 1964 the volume of goods being moved from China into North Vietnam was between 1,200 and 1,500 mt per day,* which amounted to about one-half the estimated capacity of the line. The rail line, therefore, could carry an additional 1,500 to 1,800 mt per day into North Vietnam. The estimated seaborne imports during 1964 amounted to at least 700,000 and possibly as high as 800,000 mt, or between 1,900 and 2,200 mt per day. The railroad could carry the majority of this tonnage and the remainder could be moved by highway transportation.

Although it is believed that the above estimate of the railroad capacity is within a reasonable order of magnitude, the capability of a railroad cannot be estimated with precision. Actual operation of a railroad is the only way that its capability can be established. Even then, traffic can be increased to a higher level within a reasonably short time period and without an excessive expenditure of labor and materials. It must be concluded, therefore, that in the event North Vietnam could not receive any imports by sea, the P'ing-hsiang - Hanoi railroad would have the capacity to carry most of the volume of seaborne imports that North Vietnam is estimated to have received in 1964.

Possible congestion at the transloading point at P'ing-hsiang, where freight is transshipped between the cars of the narrow gauge railroad of North Vietnam and the standard gauge railroads of China, might initially limit the actual tonnage transported to a figure somewhat below the estimated

* Including North Vietnamese imports and Chinese transit traffic moving between the Chinese provinces of Kwangsi and Yunnan by way of the North Vietnamese railroad.

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capacity of the line. The transloading facility has been expanded significantly in recent years, however, and no significant delays or limitations on traffic are known to have occurred in the past from the transloading operation. If continued congestion occurred at the transloading point, it could be eliminated by further expansion of the transloading facilities, a task that could be accomplished rather easily and probably within one month.

The narrow-gauge rolling stock park probably would not be a limiting factor in the attainment of the estimated capacity of the P'ing-hsiang - Hanoi line. Although North Vietnam has only about 1,800 freight cars and 120 locomotives, Chinese narrow-gauge rolling stock from the Kunming Railroad Bureau could be used to supplement a deficiency in the North Vietnamese rolling stock park if Communist China were to consent to give priority to the movement of North Vietnamese imports. Furthermore, rolling stock presently used to move seaborne import and export traffic within North Vietnam could also be used. Repair and servicing facilities are believed to be adequate to maintain railroad equipment. The North Vietnamese, however, probably do not have enough narrow-gauge tank cars for carrying the petroleum imports over the longer distances that would be required if all imports were received from or through China by railroad. In 1964 seaborne petroleum imports amounted to 142,000 mt. Some petroleum products could be moved in drums by rail or by motor truck, but these methods would require considerably more time and effort than the rail movement by tank cars. The inability to divert all petroleum shipments to the rail system for movement by tank car

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could be the most serious problem for North Vietnam in the event of a blockade. If the Chinese were to permit the North Vietnamese to use the narrow-gauge tank cars normally used to transport petroleum to Yunnan Province, the North Vietnamese would have sufficient tank cars to transport the petroleum on the P'ing-hsiang - Hanoi line.

Motor vehicle transportation can be used to supplement rail transportation in the event of a sea blockade because the roads leading from Communist China to North Vietnam are capable of supporting considerable truck traffic. At present trucks, gasoline, and spare parts must be imported by North Vietnam and are scarce items. North Vietnam has at least 10,000 civilian and military trucks. In view of the current essential uses for trucks, the extent to which motor transport could be allocated to supplement the railroad would depend upon the priority that North Vietnam and China would be willing to give the movement of the imports of North Vietnam which currently arrive by sea. Moreover, the cost of motor truck transport is at least three times the cost of railroad transport.

It appears, therefore, that if North Vietnam and China are willing to establish priorities for the movement of the imports which currently arrive in North Vietnam by sea, sufficient transportation can be found for these shipments. The added cost of transportation by rail, nevertheless, from Fort Bayard (Chan-chiang), the closest Chinese port for a rail movement to consuming areas in North Vietnam,* may be sufficient to force North Vietnam

* The distance from Fort Bayard to Hanoi is about 840 kilometers.

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to dispense with some of the low-value imports which are currently received by sea.*

Although the volume of exports shipped to China by rail is not large currently, the railroad to P'ing-hsiang patently does not have sufficient capacity to move all export cargoes. Identified exports in 1964 were 1.6 million metric tons and total exports may have been as high as 2 million tons.** Moreover, complicated transportation arrangements would have to be established within North Vietnam to move some of these exports in the event of a blockade. Coal from the ports of Cam Pha and Hon Gai, for example, would have to move by barge and/or truck and hence rail. It is probable that the cost of the added rail and/or truck hauls of the low-value, heavy minerals which represent the bulk of the exports would not permit them to be competitive in world markets. The chief consequences to North Vietnam resulting from the inability to maintain the volume of exports would be a reduction in the exploitation of mineral resources and a failure to earn foreign exchange. Large trade deficits, normally covered by economic aid from Communist countries, are characteristic of the North Vietnamese economy. Reduction in export capability would be an irritant to the regime, which hopes to increase the self-sufficiency of the economy and holdings of foreign exchange. Reduction in the exploitation of minerals and in the volume of exports would, however, free transport facilities which could be used to transport priority imports and exports from and to China.

* Seaborne imports during 1964 consisted principally of food grains, fertilizer, petroleum products, timber, and miscellaneous goods.

** North Vietnamese exports consisted principally of coal, apatite, and cement. In addition products of agriculture, forestry, fishing, and handicraft earn considerable foreign exchange for North Vietnam.

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IV. Impact of Interdiction of Rail Lines*

A. Importance of the Three Main Railroad Lines in North Vietnam

The main railroad network of North Vietnam consists principally of three meter-gauge lines radiating from Hanoi as follows: 1) Hanoi to Dong Dang, 2) Hanoi to Haiphong, and 3) Hanoi to Lao Cai. The Hanoi - Dong Dang line connects with the standard-gauge network of Communist China with a transloading station at P'ing-hsiang in Kwangsi Province and the Hanoi - Lao Cai line connects with the Chinese meter-gauge line to K'un-ming in Yunnan Province. There is no direct connection between the Chinese meter gauge network in Yunnan and the main network in China. All rail traffic between Yunnan and the rest of China, therefore, must transit North Vietnam by moving on the Hanoi - Dong Dang and Hanoi - Lao Cai rail lines or by moving between North Vietnam's major seaport of Haiphong and Yunnan on the Hanoi - Haiphong and Hanoi - Lao Cai rail lines.

Almost all international freight and passenger traffic carried by land transportation between North Vietnam and China and between the USSR and North Vietnam moves on the Hanoi - Dong Dang line. There are no major industrial centers or mining areas located along the Hanoi - Dong Dang line, however, and the volume of freight carried on the line in 1964

* The estimates in this section have been made on the assumption that the use of the railroad lines can be denied, a condition which in fact will be difficult if not impossible to achieve. As a practical matter some traffic can be expected to move over most railroad lines even in the face of intense aerial bombing and/or sabotage. At the same time, targets selected for rail interdiction may also interdict the movement of traffic by road temporarily, a possibility which has not been given consideration.

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probably was a little less than that on each of the other two lines. The Hanoi - Haiphong line serves as a main transport route for North Vietnamese imports and exports moving through the port of Haiphong. The volume of traffic moving on this line in 1964 probably was somewhat greater than the tonnage moved daily on the Hanoi - Dong Dang line and probably was about the same as that on the Hanoi - Lao Cai line. The Hanoi - Lao Cai line serves the major industrial centers of Viet Tri and Lam Thao, located about 20 kilometers west of Viet Tri on the Red River, and the major apatite mines near Lao Cai. The volume of traffic on this line was [redacted]

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25X1C [redacted] to have been an average of 7 freight trains each way per day in December 1964 (some 2,500 tons of cargo) between Lao Cai and Yen Bai, located about half way between Lao Cai and Hanoi. Probably about half of these trains carried domestic freight and half carried Chinese transit freight.

B. Alternatives to Railroad Service

If the North Vietnamese were denied the use of rail service, highway, sea, and inland water transportation would be available for use as alternates. Through capacity for main roads that could be used as alternatives for each of the three rail lines is given as follows:

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<u>Rail Line*</u>	<u>Road</u>	<u>Maximum/Minimum Capability in Metric Tons Each Way Per Day**</u>
Hanoi .. Dong Dang	Hanoi - Dong Dang Alternate Road System Through Mong Cai	800/200 <u>1,000/250</u> <u>1,800/450</u>
Total		
Hanoi-Haiphong	Hanoi-Haiphong	1,050/450
Hanoi - Lao Cai	Hanoi - Lao Cai	500/0

* The capacity of the Hanoi - Dong Dang rail line is estimated at 3,000 mt each way per day. The capacity of the other two rail lines is estimated to be at least as high as the Hanoi - Dong Dang line and probably higher.

** Capability estimates are taken from DIA and depict the maximum and minimum tons deliverable forward per day. Maximum/Minimum estimates correspond, respectively, to optimum subsoil moisture conditions and wet subsoil conditions reflecting the dry and wet seasons in the country.

The port of Haiphong has a total capacity of 4,500 mt per day of dry cargo (or about 1.6 million mt per year) and 800 mt per day of petroleum in bulk (or nearly 300,000 mt per year). During 1964, imports of dry cargo moving through Haiphong are estimated to have been at least 560,000 mt and possibly as high as 660,000 mt. Exports through Haiphong in 1964 are estimated at about 800,000 mt, giving a total of almost 1.4 million to 1.5 million mt of dry cargo -- a level which approached the capacity of the port for dry cargo. In addition, about 142,000 mt of petroleum products were imported through Haiphong in 1964, a level of

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about half the port capacity for petroleum. There is a comparatively high capacity road and an extensive inland water network between Hanoi and Haiphong and it is believed that the movement of supplies through Haiphong would be restricted by the port capacity rather than by the capacity of the highway and inland water network. The inland water network also extends to the iron and steel complex at Thai Nguyen by way of the Song Cau and, for small boats, to Lao Cai by way of the Red River.

Small amounts of high-priority goods could be flown from Chinese airfields to North Vietnam. Shortages of spare parts and fuel for aircraft in North Vietnam and China, however, would limit the use of air transportation unless an airlift were supported by the USSR.

1. Denial of the Hanoi - Dong Dang Line

As stated in Part III above, the volume of international rail freight moving from Kwangsi through Dong Dang toward the end of 1964 is estimated to have been about 1,200 to 1,500 mt per day, of which about half was transit traffic for Yunnan and half was destined for North Vietnam. The Chinese transit traffic, includes about 350 mt per day of petroleum products most of which is moved in tank cars. The international freight destined for North Vietnam includes large amounts of coke and coking coal for the iron and steel complex at Thai Nguyen which consumed about 500 mt per day during the last 3 months of 1964. There is only a small amount on international freight moving out of North Vietnam through Dong Dang.

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In theoretical terms there would be sufficient highway capacity during the dry season (October through April) to move the estimated traffic normally moving on the Hanoi - Dong Dang line, but during the wet season (May through September) only about 30 percent of the railroad traffic could be moved. As shown in the tabulation above, the two road systems connecting North Vietnam with China that can be used as alternates to the Hanoi - Dong Dang line have a maximum capacity larger than the estimated rail traffic moving at the end of 1964 but a much lower minimum capacity.

In fact, even if road capacity is unaffected by the bombings, limitations such as truck inventory, fuel, and service facilities make it unlikely that this traffic could be absorbed by the highway system particularly if local traffic requirements are also to be satisfied. There are no inland water routes that can serve as alternates to the Hanoi - Dong Dang line. Sea transportation, as an alternate to the rail line, probably would be limited because the port of Haiphong already is working near the capacity level, except in the case of petroleum. It is likely, therefore, that Chinese petroleum for Yunnan could and would be moved through Haiphong.

2. Denial of the Hanoi-Haiphong Line

If the North Vietnamese were denied the use of the Hanoi-Hai-phong line, a significant amount of the North Vietnamese imports and exports and Chinese transit traffic that normally moves over this line could be moved over the road and the inland water network between the two cities.

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In addition, a large share could be shifted to the Hanoi - Dong Dang rail line by utilizing South China ports instead of Haiphong. At the level of traffic estimated for the last part of 1964, this rail line had an excess capacity of about 1,500 to 1,800 mt per day for traffic moving into North Vietnam and a much larger excess capacity for outgoing traffic. It is estimated, therefore, that alternative means of transportation could carry almost all additional traffic necessitated by the loss of the Hanoi - Haiphong railroad line.

3. Denial of the Hanoi- Lao Cai Line

If the North Vietnamese were denied the use of the Hanoi - Lao Cai line, some freight to and from northwestern North Vietnam could be shifted to road and inland water transportation. The Red River is navigable for small boats from Hanoi to Lao Cai, but the one through road between the two cities has only a small capacity during the dry season and is not capable of supporting trucks during the wet season (see the tabulation above). Viet Tri and Lam Thao are located on the Red River and probably could be served by water transportation instead of rail. It probably would be extremely difficult, however, for the North Vietnamese to transport much of their apatite by either highway or inland water from the area of Lao Cai. Almost all Chinese transit traffic through North Vietnam probably would be halted because of the high cost and limited capacity of the road and inland water system to Lao Cai. This would

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necessitate increased highway and possibly air shipments within China to serve the needs of Yunnan Province.

4. Denial of All Three Rail Lines

The denial of North Vietnam's three major rail lines would have a major impact on the country. Communist China would also be affected adversely by the denial of almost all of its transit traffic.

These lines are responsible for moving about 90 percent of all railroad traffic in the country. In 1964 the railroads in North Vietnam accounted for 53 percent of all traffic moved measured in ton-kilometers and 22 percent measured in tons carried. The denial of the transport service represented by these lines amounts to 50 percent of the total ton-kilometers produced in the country. The volume of transport output that could be produced by the remaining modes would be comparable with that produced by all modes in 1959. Economic difficulties and hardships would occur, because these railroad lines serve the most economically important part of the country, in which is located almost all of the country's modern industry and a major share of the cultivated land.

Although North Vietnam's highway and inland waterway systems, as well as the port of Haiphong, would have the capacity to handle the increased foreign trade traffic, they could not at the same time also adapt to the changed requirements for internal transport. This arises principally because they lack adequate resources in terms of motive power, fuel, and

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materials to adjust to the loss of railroads. In order to cope, moreover, with the substantial dislocation of the internal distribution system, Vietnamese authorities would have to resort to a strict rationing of transportation resources. They would, perforce, also have to limit actual foreign trade movements to those imports and exports which were of high priority.

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V. Impact of a Denial of Rail and Sea Access to North Vietnam

Blockade or destruction of the principal ports of North Vietnam coupled with the interruption of traffic on the rail lines leading to Communist China would seriously restrict the movement of the country's foreign trade both by sea and by land. Neither truck transport on the road systems connecting China and North Vietnam nor North Vietnamese air transport has the equipment, fuel, or facilities to handle more than a small fraction of the volume of goods currently being imported if the normal traffic hauled by truck is also maintained.*

North Vietnam is dependent on foreign trade for its industrial development, and denial of most imports for a period of 2 months or longer would seriously disrupt the industrialization program, cause a drastic fall in the output of modern industry, and bring to a halt the construction of industrial projects currently underway. North Vietnam, for example, is dependent on imports of coking coal from China for the two blast furnaces at the Thai Nguyen iron and steel plant and denial of these imports would soon bring operations to a halt at this installation. Manufacturing industries, which account for more than 70 percent of the gross value of the output of modern industry, probably would be able to continue production for one or two months on the basis of current stockpiles. With the

* A naval blockade plus interdiction of the rail lines would also restrict exports, resulting in an annual loss to North Vietnam of approximately US \$100 million in foreign exchange, about 20 percent of which would represent a loss of earnings from the Free World.

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depletion of these stockpiles of materials, however, such industries as machine building and textiles would be forced to curtail production drastically unless imports of steel and raw cotton were resumed. The denial of most imports would not significantly affect the production of chemicals and cement, because they use local materials for production. The most important effect would result from the denial of imports of petroleum products. Lack of petroleum would cause plants to sharply curtail their activities and motor transport to substantially reduce its operations within 2-3 months. Cutting off the flow of imported spare parts for machinery and equipment would also have a serious impact on both industry and transportation.

Since the economy of North Vietnam is basically one of subsistence agriculture and is essentially self-sufficient in food, the denial of imports would have little effect on the over-all food supply of the population. For example, even though per capita production of food crops in 1964 declined by about 2 percent from the level of 1961, identified sea-borne imports of corn, grains, and bulk foodstuffs in 1964 amounted only to approximately 160,000 tons. Although some additional food may have been shipped overland, the total imported by land and sea combined must have been an amount equal to less than 5 percent of rice production alone. Since the outlook for agriculture in 1965 appears to be somewhat more optimistic than in the last several years, a denial of food imports in

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1965 would probably have even less impact than in the past.

Interdiction of the main rail lines and principal ports of North Vietnam would also increase the time required for the importation of military supplies but would not significantly hamper the war effort against South Vietnam. The larger key items of military equipment have probably been stockpiled and smaller items such as small arms and ammunition could be airlifted or moved from China by truck or primitive means of transport. Thus the impact of interdiction on the supply of military materiel probably would be felt gradually if at all. The greatest impact on military operations would result from the denial of petroleum products which would reduce the mobility of some of the military forces operating in Laos and South Vietnam. Even in this respect, however, the North Vietnamese could use trucks to import petroleum for the military and could also substitute extensive use of surplus manpower for the transportation of necessary supplies and equipment. Experience in Korea showed that it is virtually impossible to halt the flow of essential military supplies by transport interdiction.

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